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DOES EXPOSURE TO RETURNING SEN STUDENTS HARM PEERS' OUTCOMES?[*]

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Abstract

Returning SEN (special educational needs) students from segregated settings to regular class rooms may have spill-over effects on their peers. Using a combination of survey data and data from administrative registers from Denmark, I investigate whether becoming exposed to returning SEN students affects cognitive and non-cognitive outcomes of other students in the school-grade cohort. Using a student fixed effects approach to remove selection bias, I find that exposure to recently returned students does not significantly affect peers' outcomes. An additional analysis on the effect on returners themselves finds that while reading results are unaffected, returners experience large improvements in math achievement of roughly 65% of a standard deviation over a three year period. Intermediate and advanced math skills are more affected than basic skills.

Keywords: education economics; student fixed effects; difference-in-differences; education; special needs education; mainstreaming; externalities; peer effects
JEL Classification: I20

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1. Introduction

Countries around the world organize education for children with special education needs (SEN) in different ways. The models adopted include segregated settings like special schools or separate classes in mainstream schools, and fully inclusive settings where SEN students are taught alongside their regular programme peers. Average per student costs in segregated settings tend to be significantly higher than in regular classes and there is no conclusive evidence of the benefits of segregated education. Yet, in many countries, education opportunities for SEN students include teaching in segregated settings. As placement in special schools or classes may not necessarily last for the whole school career, some students eventually return to regular classrooms. However, not being used to coping in a regular classroom setting, the transition into regular classrooms is likely to pose challenges both to the returning student, but also to teachers and other students in the receiving classes and may influence learning outcomes.

Another element that may send students back to regular classrooms is a heightened political focus on inclusive education. Today, the general thrust is to provide special needs education in a fully inclusive setting (i.e. in regular classrooms), which is widely regarded as desirable for equality and human rights (World Health Organization, 2011). Yet, while the evidence on the benefits for the returning SEN students is mixed, researchers, policymakers, practitioners, and parents have raised concerns about the impact that returning SEN students may have on the learning outcomes of their regular classroom peers through externalities in the form of disruptions, changing pedagogy or altering resources in regular classrooms. Understanding these effects is therefore important for educational policy makers designing the transition process towards more inclusive education.

While there is a general consensus that all learners should be educated in fully inclusive settings to the extent possible, the evidence on the impact of mainstream education on academic outcomes for SEN students is mixed[1], and there is only little empirical evidence on potential spillovers on classmates. Recent evidence on the effects of the inclusion of children with various kinds of disadvantages in regular classrooms suggests negative spillover effects on their peers[2]. Yet, research focusing specifically on the effect of including SEN students in mainstream classrooms on their peers' outcomes is scarce and results are mixed. Estimating the effect of having SEN students as class mates, Fletcher (2009, 2010) and Gottfried & Harven (2015) find negative effects on other learners.[3] However, when taking account of within-grade sorting across classes by

[1] E.g. Hanushek, Kain & Rivkin (2002), Mitchell (2009).

[2] See Carrel & Hoekstra (2010) on children exposed to domestic violence; Figlio (2007) and Kristoffersen et al. (2015) on disruptive children; Cho (2012) and Diette & Oyelere (2014) on non-native English speakers; Gottfried (2013) on grade-retained peers; and Gottfried (2014) on tardy class mates.

[3] Yet, the effect on reading in Fletcher (2010) is only marginally significant at the 10% level.

estimating same-*grade* peer effects Hanushek, Kain and Rivkin (2002) and Friesen et al. (2010) find no significant effects.

This study uses data from the Danish National Panel Study for Inclusion to examine peer effects associated with returning SEN students from segregated education to regular classrooms. Specifically, I estimate the impact on student outcomes of becoming exposed to a same-grade SEN peer who has recently returned from segregated education to a regular classroom. Moreover, to control for nonrandom selection, this study takes advantage of longitudinal information from administrative registers on individual students in multiple student-grade cohorts to control implicitly for time-invariant student effects on test scores. The effect of becoming exposed to a returning SEN student on the outcomes of regular classroom peers is thus identified by changes over time in the presence of a returner in one's grade-cohort.

Denmark is an excellent place to study effects of inclusion. On top of the substantial degree of openness between different educational settings which gives rise to flows not only *into*, but also *out of* segregated education, the national policy initiative to move towards more inclusive schools increases the number of returning SEN students. Starting from a situation with comparatively low inclusion rates[4] in 2011 (94.4%), state policies have been directing schools to mainstream SEN students into general education classrooms. A national target has been set to increase the inclusion rate to 96% within a three year period (2012-2015). Reaching this goal both implies keeping more students in inclusive settings in the first place, but also bringing back students from segregated settings to regular classes.[5] Policymakers and parents in the schools that take in these students may wonder what the consequences will be for the other learners in the receiving regular classrooms. The main analysis in this study focusses on the impact of the latter on peer outcomes in receiving cohorts. The main contribution of this paper is this being the first study of the externalities of returning SEN students on their peers' educational outcomes. Returners may be more difficult to accommodate in regular classes than other SEN students who were never sent to segregated settings – both because they may on average have a higher degree of special needs (since they have been sent to special classrooms in the first place), but also because they face an entirely new education setting upon their return that they may not easily adapt to. Thus, understanding the impact of returners is relevant, in particular for school systems moving towards a more inclusive approach to special needs education. Moreover, I also provide evidence on the effect of returning on SEN students achievement.

The main results provide no evidence of negative externalities of returning SEN students on cognitive and non-cognitive outcomes of regular classroom peers. I find a

[4] Inclusion rates measure the *total* share of students educated in inclusive settings (i.e. not the share of SEN students in inclusive settings).

[5] This means that students attend a regular classroom (in a mainstream school) for the main part of the school week. Students may receive extra support if needed either within the regular classroom or in separate resource rooms.

large positive effect of returning on the returners themselves on Math achievement, but no effect on reading testscores.

2. Background

Historically, children with special educational needs have often been excluded from mainstream education opportunities. In many countries early provision of education was generally through separate special schools. In 1994 the World Conference on Special Needs Education in Salamanca, Spain, produced the so-called Salamanca Declaration, a statement and framework for action, which encouraged governments to design education systems that provide for groups with diverse needs so that all students can have access to regular schools (World Health Organization, 2011). Today, many school systems hold both integrated and segregated alternatives for SEN students. By international comparison, Denmark has a large number of students educated in segregated settings. Moves between segregated settings and regular classrooms are common due to frequent re-evaluations of SEN students' development. This makes Denmark a natural choice when studying externalities of returning students to regular classrooms.

Moreover, over the last decade, a general consensus has developed to move from a broad sense of inclusion, whereby education may take place in a range of settings, such as special schools, or special classes, or regular classes in mainstream schools, to a stricter sense of inclusion, under which all children with disabilities should be educated in regular classrooms with age-appropriate peers. The transition towards higher inclusion rates may imply larger-than-usual return flows from segregated to inclusive settings. Half a decade ago, rapidly rising spending on special needs education in Denmark and a high exclusion rate highlighted the need for reform with the aim to provide education for more students in regular classrooms. Average per pupil costs in segregated settings is significantly higher than for students in regular classes.[6] In 2008/09, segregated special needs education absorbed more than 80% of overall special needs education spending (Ministry of Finance, 2010).

In 2012, a reform of special education was implemented including the target to increase inclusion rates from 94.4% to 96% by 2015. A legislative change in the Folkeskole Act (narrowing the definition of special needs education to include only extensive extra support) and an agreement between the municipalities and the national government (outlining objectives for increased inclusion) were followed by a change in the

[6] According to Ministry of Finance (2010, p. 15) in 2008/09 costs averaged DKK 280,000 – or $45,000 - for students in special schools, DKK 185,000 – or $30,000 - for students in special classes, compared to DKK 85,000– or $14,000 - for SEN students in regular classes. These numbers are not directly comparable, since the educational needs of SEN students who are included in regular classes are different that those of students educated in segregated settings. Yet, this example highlights a large variance in costs. To the extent that these may not (all) be justified for (all) students, money might be more effectively spent otherwise.

economic incentives for the schools to include students with special needs education in regular classes. This was accomplished by decentralizing financial responsibility for special needs education from the municipal level to the schools. This change gave strong financial incentives for the schools to provide for SEN students in an inclusive setting (since segregated settings tend to be considerably more expensive).[7] Higher inclusion rates may be achieved both by (i) keeping more students with special needs in regular classes instead of segregating them to special schools or classes and by (ii) returning students from segregated settings to regular classrooms. Evidently, both measures imply that more regular students than before have SEN-students as classmates, including recently returned students. Of both measures, returning students from segregated settings to regular classrooms was by far the most controversial part of the reform and has caused concern among parents and teachers in regular classrooms.

In order to meet the challenge of moving towards more inclusive education, a number of initiatives have been undertaken to support the reorganization process in the municipalities including financial incentives, school reform[8], information and attitude campaigns for parents and students and follow-up work.[9] Initiatives to make regular classrooms more inclusive include a strengthened focus on individualized teaching in regular classrooms, temporary subdivision of class, additional lessons, two teachers in class, teachers' assistants, and individual support to help the SEN students overcome practical obstacles related to school attendance.

Special education in Denmark

In Denmark, special education may take place in a range of settings – such as special schools, special classes or regular classes in mainstream schools. In 2013, Denmark adopted a narrow definition of special needs education, which includes only students with more than 9 hours a week (or 12 teaching hours) of extra support. In 2015, five percent of all students in public schools are defined as having SEN.[10] Only 5% of these students are mainstreamed in regular classes, while the remaining 95% are taught in segregated settings (39% in special schools and 56% in separate classes in mainstream schools). Overall, in 2015, 4.8% of all students are taught in segregated settings. Thus, the inclusion rate – the percentage of students educated in mainstream classrooms - is 95.2% in 2015 (up from 94.4% in 2012).

[7] Research has shown that changes in fiscal incentives are related to changes in special education growth in the US (Cullen 2003, Kwak 2010). Furthermore, a rise in special education enrolment has also been related to the introduction of school accountability policies (Jacob 2005). In Denmark, the publication of school results was introduced during the period of rising exclusion rates. However, whether or not there is a causal relation remains to be examined.

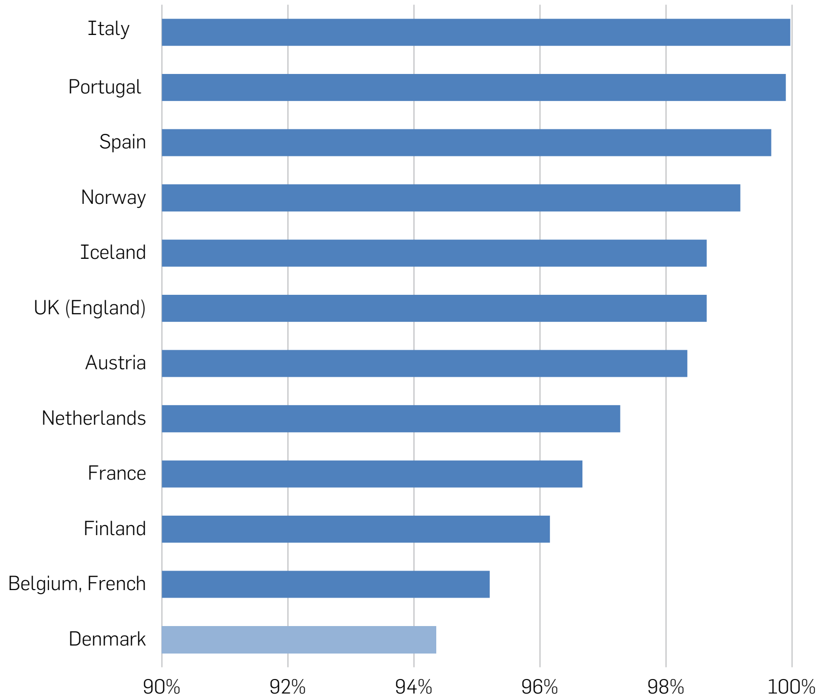
[8] E.g. improving teachers' and staff's skills/professional development, counseling and renewal of guidelines.

[9] For example monitoring of shift towards more inclusion by the Ministry, and other governmental support.

[10] Author's own calculation based on administrative data from the Ministry of Education (2015).

Across European countries, 2.3% of students within compulsory schooling are educated in segregated settings (World Health Organization, 2011). Yet, countries vary widely in the numbers of children who receive education in segregated settings (Figure 1). In some countries segregated education is virtually non-existent (Italy, Portugal, Spain), while other countries exclude part of their student population from fully inclusive education (e.g. Belgium (French), Denmark, Finland, France, the Netherlands)[11]. Thus, in an international comparison, the percentage of students educated in segregated settings is high in Denmark.

Figure 1: Inclusion rates across countries (percentage of students educated in regular classrooms)



After changing the definition on special needs education, the number of SEN students with less than 9 hours of special needs education is unknown, because data on special education services relating to these students is no longer collected. The most recent

[11] The Netherlands, France and Finland educate 2-4% and Belgium (French) and Denmark 4-6% of their students in segregated settings (author's own calculations based on data provided in European Agency for Development in Special Needs Education, 2012). The data refers to the percentage of all compulsory-age students, not only to students who have been officially identified as having SEN. There are no universally agreed definitions for the concepts of special needs education. International comparison of data on children with special education needs is hampered by differences in definitions, classifications, and categorizations. The only comparable data is the percentage of students who are educated in segregated settings. The European Agency for Development in Special Needs Education has an operational definition for segregation (*education where the pupil with special needs follows education in separate special classes or special schools for the largest part (80% or more) of the school day*), which most countries agree upon and use in data collection.

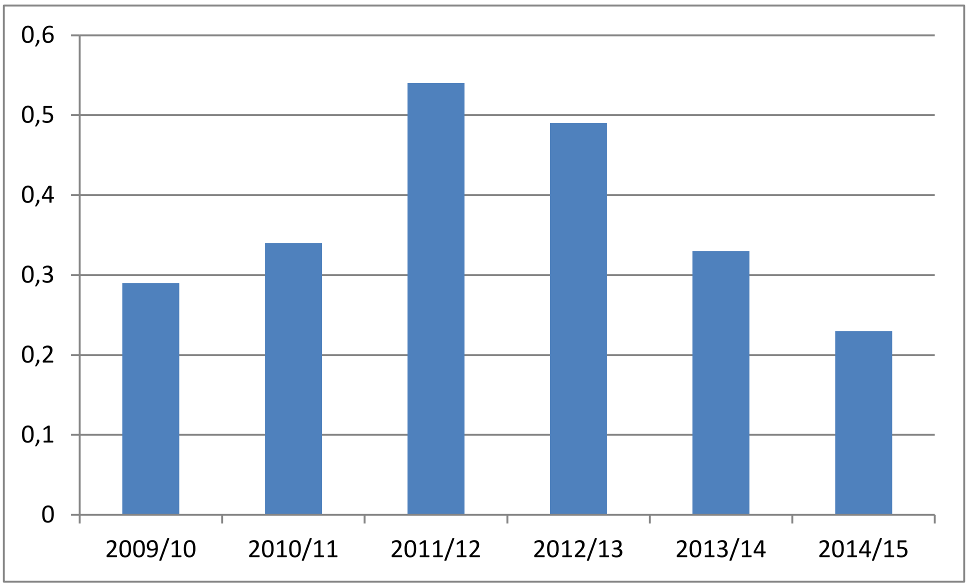
numbers available are from 2012. In 2012, 4.8%[12] of all compulsory-aged students received less than 9 hours extra support due to their (minor) special educational needs. Students with minor special needs remain in regular classrooms and receive special education as a supplement to the general teaching.

The proportion of compulsory-aged students who are identified as having SEN varies across countries, but international meaningful comparisons are hampered by differences in definitions and assessment of SEN-students. According to the (tentative) numbers provided by the European Agency for Development in Special Needs Education (2012), the percentage classified as SEN ranges from 1.6% of all compulsory aged students in Sweden to 24.2% in Iceland. Numbers for countries outside Europe are not provided by the agency, but other sources show that the percentage in the US is about 13% (age 13, 2004) and 9% in British Columbia/Canada (grade 7, 2002-04)[13].

Returners

From 2012 to 2015, the percentage of students educated in segregated settings has decreased from 5.6% to 4.8%. Thus, more students are now educated in inclusive settings, either because they have avoided being segregated in the first place, or because they have returned from special schools or classes to regular classrooms. This study focuses on returners to inclusive settings.

Figure 2: New returners as a percentage of public school students by schoolyear

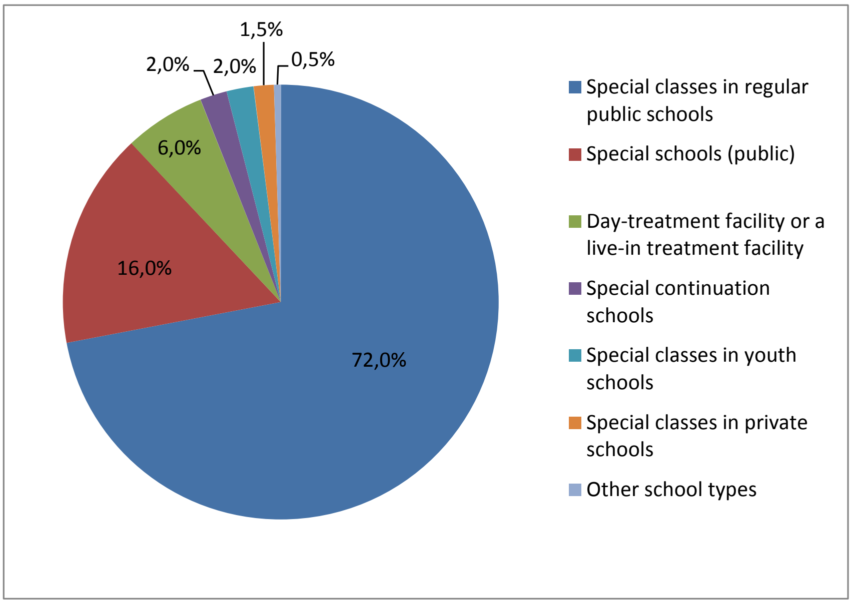


[12] Author's own calculation based on administrative data from Statistics Denmark and Ministry of Education (2015).
[13] Friesen et al. (2010)

In 2009/10, 0.29% of all public school students were students who had returned from a special class or school to regular classrooms in that school year (Figure 2). This share increased to 0.54% in 2011/12, and fell to 0.23% in 2014/15, currently the last year of data available. The decreasing number of returners in recent years probably reflects the shrinking pool of students in segregated settings capable to return to regular classrooms. While there is always a natural flow into and out of segregated special education, the temporary rise and fall in return rates during our period of study reflects the policy reform towards more inclusive education, which resulted in higher return rates in the schoolyears 2011/12 and 2012/13.

Returners are much more likely to come from special classes in mainstream schools than from special schools. Only 16% of returners attended a special school the year before returning, while 72% of returners attended a special class in a mainstream public school (Figure 3 & Box 1).[14] 82% of the returners in the relevant grade-levels have taken the national test in reading the year before they return – a substantially higher share than the 30-50% among all students in segregated education[15] and closer to the share of 92% among regular program students. Thus, the share taking the reading test is considerably higher among returners[16] indicating that returners - on average – have milder impairments than non-returners.

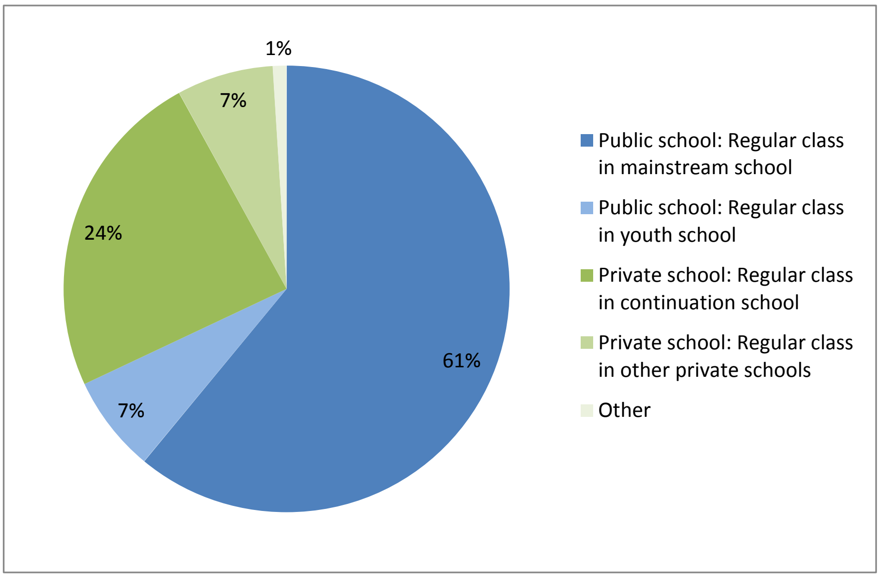
Figure 3: Share of returners by source school type (segregated settings)



[14] Before return, 6% attended school at a day-treatment facility or a live-in treatment facility. The remaining returners come from special continuation schools (2%; efterskoler med særligt tilbud), special classes in youth schools (2%), special classes in private schools (1.5%) and the remaining 0.5% return from other school types.
[15] The share taking the national test varies by grade-levels and type of setting (special school or classes). Participation is generally higher among older students and among students in special classes (Rangvid & Lynggaard, 2014).
[16] Among those who take the tests, returners score higher.

Two out of three returners attend regular classes in public schools – either regular public schools (61%) or youth schools (*ungdomsskoler*) which only offer grades 8-10 (7%). 24% return to private continuation schools (*efterskoler*[17]) and 7% return to other private schools (Figure 4). Upon return, 86% are placed in the subsequent grade-level, while others repeat a year. Only 13% receive extensive support (i.e. more than 9 hours a week) when returning to a regular classroom. Regular classroom peers in receiving schools are somewhat more disadvantaged than students in non-receiving schools, but differences are small: reading scores for receiving peers are 2.5% of a standard deviation lower than for non-receivers, the share of immigrant students is 1.6 pp. higher in receiving schools and the share of mothers with no more than compulsory education is 2 pp. higher in receiving schools than in other schools. Box 1 summarizes the descriptives on returners.

Figure 4: Share of returners by destination school type (inclusive settings)



[17] As an alternative to the Lower-Secondary school (grades 8, 9 and 10) at the *folkeskoles*, students have the opportunity to attend residential so-called continuation schools (efterskoler) from the ages of 14 – 18 for one or two years.

Box 1: Characteristics of returning students

Before return

- 72% return from special classes in mainstream schools, 16% return from special schools, 6% from a day-treatment facility or a live-in treatment facility. The remaining returners come from special continuation schools (2%; efterskoler med særligt tilbud), special classes in youth schools (2%), special classes in private schools (1.5%) and the remaining 0.5% return from other school types.
- 82% have taken the national reading tests in segregated settings before they return, compared to only 30-50% of all students in segregated settings and closer to the 92% of regular program students (public schools).

Upon return

- 2/3 return to public schools: 61% in regular public schools and 7% in youth schools (ungdomsskoler).
  The remaining return to private schools, in particular to continuation schools (efterskoler): 24%. 7% return to other private schools.
- Returners placed in slightly more disadvantaged schools.
  - Peers' reading scores 2.5% of SD lower in receiving cohorts
  - Share immigrant peers 1.6 pp. higher in receiving cohorts
  - Share of peers from low educated homes 2 pp. higher in receiving cohorts
- 86% are placed in the subsequent grade level upon return, others repeat a year.
- 13% receive extensive extra support upon return (more than 9 hours a week).

3. Estimation Strategy

The main empirical analysis examines the effect on outcomes for regular-education students of being exposed to a student in one's school-cohort who has returned from segregated education to a regular classroom during the current or the previous school-year.[18] In this study, these students are called *recent returners*.

The challenge of identifying causal effects arises if the probability of becoming exposed to a recent returner in one's school cohort is related to unobserved student and school characteristics, for example if principals can match returning student to teachers and peers based on unmeasured characteristics that also affect outcomes. This paper exploits the panel nature of the dataset with outcomes measured repeatedly for each student to control for much of the confounding variation. The effect of externalities is estimated in a framework with student fixed effects, allowing for systematic, but unmeasured

[18] In a subsection, I present an analysis on the effects of returning on returners themselves.

differences across students. This identification method is used in related studies, e.g. Cho (2012) and Fletcher (2010). Students fixed effects models are generally superior to simple cross-sections, since using the difference in outcomes between two measurements removes any student-level fixed effects on the outcome. Thus, all time-invariant individual differences in outcomes across students are accounted for by the fixed effect. As a result, the condition for causal identification is less restrictive, since exposure to recent returners needs only be exogenous to *changes* (not to *levels*) in test scores.

The equation

$$Outcome_{igst} = \alpha + \theta RR_{gst} + \mu_i + \varepsilon_{igst} \qquad (1)$$

models the outcome, $Outcome_{igst}$, for student i in grade g and school s at time t as a function of vectors of family characteristics (X), exposure to a recent returner in the grade-cohort (RR), a student fixed effect μ_i, and a random error (ε_{igst}). The coefficient θ captures the impact of having a recent returner in the same grade-level on reading test score gains of regular students. Although available in the data, student background characteristics are not included, because the student-fixed-effect wipes out time-invariant variables at the student level.

Eliminating student fixed effects in outcomes means that θ in equation 1 is identified by the change in outcomes for students who are not exposed to a recent returner during the first period, but are exposed in the second period.[19] Following the baseline analysis of average effects of exposure to recent returners for all students, I proceed by investigating the possibility that regular-class peers with special educational needs and other peers are affected differently. For example, SEN peers could be affected more from being exposed to recent returners as they might rely more on teacher time for learning. On the other hand, SEN students might profit since their needs might be better met as this group of students gains importance due to a heightened focus on SEN students' needs in general in the class caused by the returner.

A potential threat to the identification strategy would arise if mainstream peers selectively opt out of exposed grade levels, since post-outcomes would not be recorded. Yet, auxiliary analyses show that treated students are not more likely to have missing post-outcomes than untreated.

4. Data

This paper utilizes a combination of survey and administrative microdata to shed light on the peer effects of returning SEN students from segregated settings to regular classrooms.[20]

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[19] The main specification considers only entry into exposure, since exits may be less exogenous.
[20] Data is stored at Statistics Denmark.

The survey data has been collected as part of the project "Danish Panel Data Study of Inclusion", which has been commissioned by the Ministry for Children, Education and Gender Equality. The project is follow-up research on the national policy initiative to provide more inclusive education. This large-scale data collection monitors the move towards more inclusive schools from the students' point of view. Students surveys have been administered five times over a two year period: from spring 2014 to spring 2016. The surveys collect information on non-cognitive student outcomes like well-being at school, participation and motivation. Two grade cohorts of students in almost 200 schools are tracked for two years. Students in grade-levels 5 and 7 in the schoolyear 2013/14 are tracked through the schoolyear 2015/16 when these students are in grade-levels 7 and 9.

The part of the data derived from administrative registers contains extensive and reliable information on test scores and students' family background, as well as school and grade identifiers. Unique IDs permit linking the student records with separate special-education information on academic setting for SEN students, ranging from regular classroom over separate classes in regular schools to separate schools. Importantly for the empirical strategy, the data allows us both to identify SEN students who move from segregated to inclusive educational settings, and to select their same-cohort peers in regular classes.

Samples

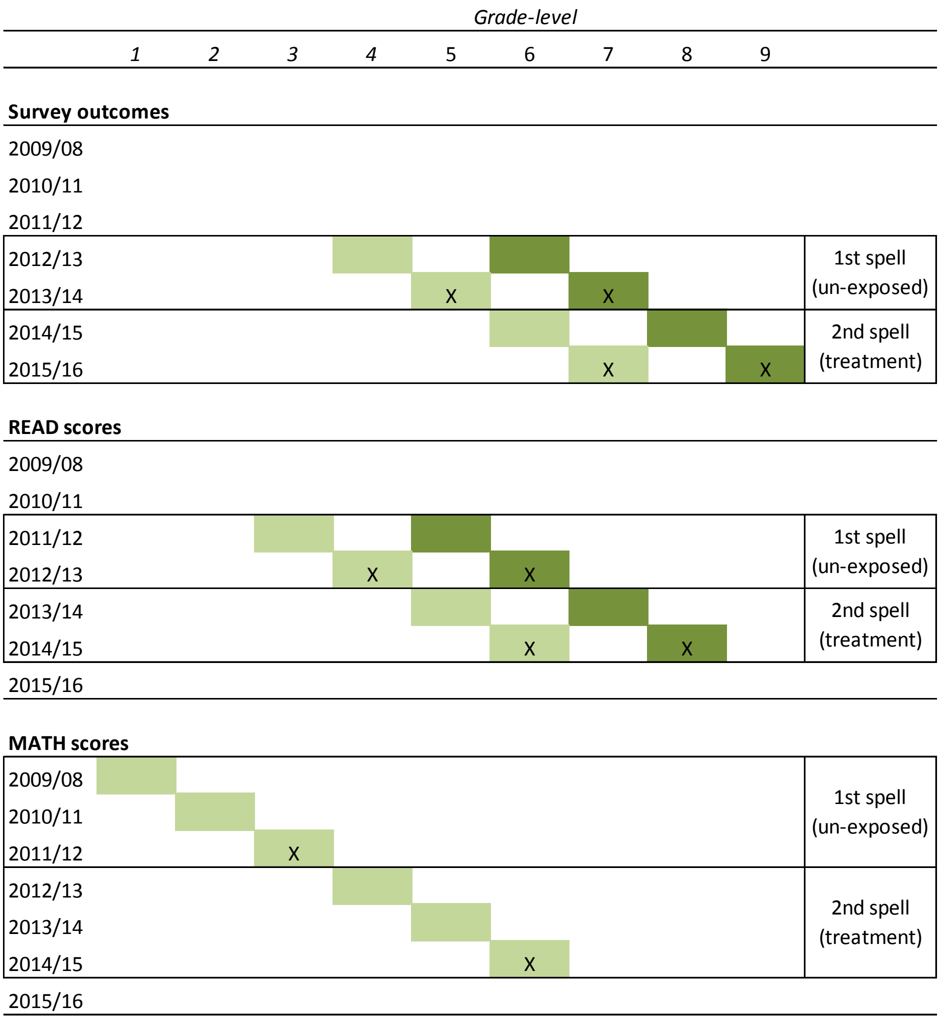
Sample for survey-outcomes Roughly 9,350 students were asked to fill in the survey. Valid data is available for roughly 8,000 students for the pre-outcomes (i.e. the first wave in spring 2014) and roughly 6,800 students for the post-outcomes (i.e. the last wave in spring 2016).[21] For the estimations I only keep students with valid data for both the pre- and the post-survey, between 4,500 and 4,900 students. Last, I only consider transitions into exposure since transitions out of exposure might be less exogenous. This reduces the final estimation samples to about 2,900 – 3,000 students.

Sample for register-outcomes For the analysis of testscore outcomes which derive from the administrative registers and which in principle are mandatory, valid data for more students is available. Valid reading pre-testscores are available for about 8,900 of the 9,350 students participating in the project (IP), while 9,000 students have valid post-scores. Due to the (different) spacing of Math tests, pre- and postscores are available only for the younger cohort of the Inclusion Panel (grade 5 in 2014; Table 1). Math pre-scores are available for about 4,350 students and 4,500 students have valid post-scores. Only students with valid data for both the pre- and the post-score are kept for the estimations: 8,600 and 4,250 students respectively for reading and Math.

[21] For the post-outcomes, I use results from the next-to-last survey from Autumn 2015 in the case of missing data in the last survey.

Only keeping transitions *into* exposure[22] reduces the final estimation samples to about 6,200 and 3,900 students for reading and math.

Figure 5: Structure of data



Note: The different shades of green denote the two student cohorts in the Inclusion Panel sample. Schoolyears with outcomes measurements are marked with X.

Treatment: exposure to returners

The primary variable of interest is exposure to a recent returner, i.e. the presence of a recent returner in the same grade, school, and year in at least one of the two years between the pre-outcome-measure and the post-outcome-measure (three years for math). In this study, students are observed for two spells. The analysis focusses on entry into treatment, i.e. the estimation sample consists of students who are not exposed

[22] Transitions out of exposure might be less exogenous.

to returners in the first spell. In the second spell, students may remain unexposed or become exposed to a returner.

A student is ‘exposed’ if there are one or more recent returners in the school-grade-year cohort in one of the school years between the pre-score and the post-score measurement. For example, for the survey-outcomes and the younger cohort, the outcome in the first spell (pre-outcome) is measured in grade 5 and the outcome in the second spell (post-outcome) in grade 7. The first potential year of treatment is grade-level 6 and the second is grade-level 7.[23] Figure 5 shows the structure of the data.

The treatment period varies across outcomes depending on the availability of outcome data for the two cohorts. For survey outcomes, the treatment period covers the schoolyears 2014/15 and 2015/16. The treatment period for the reading score outcome covers the schoolyears 2013/14 and 2014/15, while the treatment period for math covers three schoolyear: 2012/13, 2013/14 and 2014/15 due to the 3-year spacing between math tests.

Exposure is measured at the school-cohort level rather than at the class level due to potential sorting of recent returner across classrooms within a school and grade based on unobservable criteria. Recent returners are defined as students who have been educated in segregated settings (special school or special classes), but have returned to inclusive education (regular classes) in the current or the previous schoolyear. As in the overwhelming majority of cases there is either none or only one recent returner in the school cohort, the variable of interest is created as a binary variable indicating whether a student has at least one recent returner in the same grade or not.

Outcomes

Outcomes collected as part of the Inclusion Panel Nine outcomes derive from data collected as part of the Inclusion Panel Study, where students answer a questionnaire in each survey wave. Eight variables are constructed by factor analysis methods from questions in the student surveys and another variable is constructed from an attention test the students participated in.

The following outcomes are used:

- **Motivation and effort** includes the extent to which a student says he is interested in learning, actively participates when working together with classroom peers, and completes the assignments given to him by his teacher.

[23] Both the survey-data used for measuring pre- and post-outcomes and the national test scores are measured in spring, towards the end of a school-year. Therefore, the potential school years of treatment are defined as the two grade-levels *following* the prescore measure (here: grades 6 and 7) rather than the prescore year and the year after that (grades 5 and 6).

- **Academic self-confidence & progress**. Experiences of academic self-confidence & progress include four items that examine the extent to which 1) students think they do well in school, 2) students think they can do the tasks or assignments given by their teachers, 3) students feel they make progress, and 4) students think they read fluently (fast & accurate).
- **Student-teacher relations**. Experiences of student-teacher relations include five items that examine the extent to which 1) students like their teachers, 2) students are treated fairly by their teachers, 3) teachers do something about it when a child is bullied, 4) teachers do something for the well-being of all students in the class, and 5) teachers succeed in making their class interesting.
- **Well-being at school** includes six dimensions of enjoying being at school: 1) students may like attending school; 2) they may like their peers in class; 3) treat each other well in class; 4) they are allowed to participate and contribute when working with others in groups; 5) not being disturbed by noise and 6) not considering to switch schools.
- **Academic acknowledgement** includes five items examining how often 1) peers ask the student for help in class, 2) teachers compliment the student, 3) peers compliment the student when he is doing well in school, 4) when the student thinks that he has done well, his teachers agree, 5) when the student thinks that he has done well, his peers agree.
- **Participation in learning activities** includes the extent to which a student 1) frequently participates in classroom discussions; 2) puts up his hand, when the teacher asks a question (and he knows the answer); 3) actively participates when working with classroom peers; and 4) dares to say in class when there is a task/exercise he cannot do.
- **Participation in social activities** includes different ways to socialize with school peers. Students may be together with children from their class during recess or they may be together in their leisure time outside school. Finally, they may participate in school-related social arrangements (e.g. parties with the class, outings with parents or other arrangements with the entire class invited).

  All indices are standardized to a mean of 0 and standard deviation of 1. Higher index-values signify higher motivation, better well-being, etc.

- **SDQ (strengths and difficulties questionnaire)** Moreover, the SDQ-index was derived from the student surveys and is used as an outcome. The Strengths and Difficulties Questionnaire is a brief behavioural screening questionnaire about 3-16 year olds. The self-report version that is used in the student survey is suitable for young people aged around 11-16, fitting with the age range of Inclusion Panel participants. For the analyses, I create a total difficulties score that is generated using three scales of the SDQ: emotional symptoms, conduct problems and hyperactivity/inattention. The score ranges between 0 and 15. For use in the estimations, the original score is reversed such that a higher score equals fewer problems and difficulties and the score is standardized to a mean of 0 and standard deviation of 1.

- **Attention** Finally, as part of the project, students took a test of attention (d2)[24]. The d2 test is widely used in Europe and measures processing speed, rule compliance, and quality of performance, allowing for a neuropsychological estimation of individual attention and concentration performance. The test can be administered within 8 minutes, either individually or in a group format. The d2 consists of 14 test lines with 47 characters in each line. Each character consists of a letter,'d' or 'p' marked with one, two, three or four small dashes. The test taker is required to scan the lines and cross out all occurrences of the letter 'd' with two dashes while ignoring all other characters. The reliability of the test has proven to be very high, and the validity of the technique has been documented by a number of research studies. For use in the estimations, I standardize the concentration performance score to a mean of 0 and standard deviation of 1.

Register outcomes The outcome variables retrieved from administrative registers are reading and math test scores from national standardized tests. Beginning in 2010, reading tests were administered each spring to students enrolled in grade-levels 2, 4, 6, and 8 in public schools, creating a two year gap between assessments. Students take math tests in grade-levels 3 and 6.

These mandatory tests are high-profile tests. They are IT-based and adaptive, meaning that tests are taken online at computers with the test system choosing questions based on the student's level of proficiency as displayed during the test and automatically calculating test results. The tests simultaneously evaluate the skill levels within three profile areas of reading (language comprehension, decoding, and reading comprehension) and math (numbers & algebra, geometry, applied math). For the analyses in this paper, test scores have been standardized for each test, grade and year to have mean zero and standard deviation one using children in the entire sample of classes that participate in the Danish National Panel Study for Inclusion.[25]

[24] http://www.hogrefe.co.uk/d2.html

[25] Specifically, first the scores are standardized for each profile area for each grade-year combination. Then, scores are averaged across the three profile areas before I standardize the average for each grade-

Table 1: Balancing: mean of pre-determined variables for treated and untreated students

	Pre-period		
	Untreated	Treated	
Well-being (at school)	0,004	-0,010	
Participation, learning activities	0,007	-0,018	
Participation, social activities	0,002	-0,005	
Motivation & effort	0,011	-0,027	
Academic self-confidence & progress	-0,005	0,014	
Student-teacher relations	0,023	-0,058	
Academic acknowledgement	0,010	-0,026	
SDQ (Strength & difficulties)	-0,010	0,026	
Concentration	0,023	-0,063	*
Reading scores	0,023	-0,033	*
Math scores	-0,003	0,003	
Male	0,506	0,523	
Lives with both parents	0,821	0,766	*
Native Dane	0,913	0,926	
Psychiatric disorder	0,034	0,032	
Mothers age at childbirth	35,2	35,0	
Fathers age at childbirth	37,5	37,6	
Mothers education			
Unskilled	0,158	0,153	
Vocational education	0,343	0,338	
High-school	0,071	0,071	
Short cycle tertiary	0,033	0,055	**
Medium cycle tertiary	0,272	0,247	
Long cycle tertiary	0,087	0,101	
Fathers education			
Unskilled	0,158	0,154	
Vocational education	0,412	0,416	
High-school	0,046	0,061	
Short cycle tertiary	0,080	0,069	
Medium cycle tertiary	0,145	0,123	
Long cycle tertiary	0,108	0,123	
Father's income (mio. DKK)	0,150	0,153	
Mother's income (mio. DKK)	0,130	0,135	*
Father's labour marked status			
Self-employed	0,076	0,077	
High wage level	0,196	0,187	
Medium wage level	0,140	0,124	
Low wage level	0,294	0,263	
Permanent income transfer	0,050	0,053	
Other	0,020	0,04	**
Mother's labour marked status			
Self-employed	0,026	0,03	
High wage level	0,146	0,147	
Medium wage level	0,238	0,205	*
Low wage level	0,284	0,301	
Permanent income transfer	0,097	0,09	
Other	0,067	0,101	**

** and ** signify significance at the 5% and 1% level.*

year combination. The resulting final measure of the reading score thus has a standard deviation of one and mean zero.

Table 1 presents results from a balancing check, which compares the means of predetermined characteristics for treated and untreated students.[26] The stars (*,**) in Table 1 signify the significance level of differences in means for treated and untreated students. Overall, there are only few differences that are significant suggesting that the samples are reasonably well-balanced, i.e. that treated and untreated students in the pre-treatment period are quite similar.

Controls

The administrative data holds a range of individual student information like gender, immigration background, psychiatric diagnosis, family type[27], maternal and paternal education level.[28] This information is not used in the main model specification, because in this study time-invariant individual and school effects are effectively controlled for by exploiting the panel structure of the dataset and including student fixed effects.[29] However, these variables are included in the robustness analysis using difference-in-differences methods, which tests the sensibility of the main results with respect to model choice.

Table 2: Share of exposed peers, treatment years and number of students by estimation sample

Samples		Share of students exposed	Treatment years 2012/13	2013/14	2014/15	2015/16	# students
Survey-outcomes		28%			x	x	approx. 3,000
Register-samples	Read	40%		x	x		6,185
	Math	49%	x	x	x		3,855

Transitions out of segregated special education

The subsequent empirical analyses focus on the effect on regular programme peers of being exposed to returning SEN students and thus rely heavily on transitions out of special education. Depending on the estimation sample, between 30 and 50% of students are exposed to a recent returner during the treatment period, Table 2. The share varies with the length of the treatment period (2 years for survey-outcomes and reading

[26] 'Treated' students are unexposed in the first period, but get exposed in the second, while untreated students are unexposed in both periods.
[27] I.e. whether the child lives with both parents or not.
[28] Table A1 in the appendix shows descriptive statistics of the variables used in the regressions.
[29] Additionally, I have considered including an indicator for whether a school cohort receives any new student during the two-year spell to control for potential disruption from any new students, not only from returners. However, a look at the data showed that this cannot be reliably estimated due to insufficient variation in the variable since 99% of all school cohorts receive new students over a two-year period.

scores and 3 years for math scores) and with the school-years covered by the treatment period. Earlier years in the period covered by the analyses have larger numbers of returners (Figure 2) and thus, more peers are exposed in analyses involving outcomes with earlier treatment periods (i.e. reading scores vs. survey outcomes).

5. The effects of becoming exposed to a returning student on peers' outcomes

Table 3 reports estimated effects of becoming exposed to a recent returner in the same-grade cohort using the student fixed effects main specification, as well as results using a DID specification serving as a robustness check. Neither results from the student fixed effects main specification nor results from the DID-models show any evidence of negative externalities of returners on any of the eleven outcomes of peers that are examined in this study.

Table 3: Regression results. Effect of exposure to returners on same-grade peers.

	Student fixed effects				DID	
	coef	se	#obs	#students	coef	se
Well-being (at school)	0.084	(0.084)	6,048	3,024	0.117	(0.069)
Participation, learning activities	-0.017	(0.063)	6,056	3,028	-0.024	(0.051)
Participation, social activities	0.049	(0.051)	5,966	2,983	0.069	(0.045)
Motivation & effort	0.021	(0.057)	6,072	3,036	0.030	(0.047)
Academic self-confidence & progress	-0.007	(0.053)	6,070	3,035	-0.010	(0.044)
Student-teacher relations	0.068	(0.070)	6,078	3,039	0.095	(0.066)
Academic acknowledgement	0.014	(0.050)	6,064	3,032	0.020	(0.045)
SDQ (Strength & difficulties)	-0.090	(0.121)	5,992	2,996	-0.126	(0.102)
Concentration	0.023	(0.107)	5,726	2,863	0.032	(0.093)
Reading scores	0.017	(0.038)	12,370	6,185	0.029	(0.037)
Math scores	0.015	(0.046)	7,710	3,855	0.030	(0.052)

Standard errors are clustered at the school level. DID models include SES-controls as shown in Table A1.

The results corroborate findings in the related literature of the effect of SEN students on their peers' test scores. Existing studies that - like my analysis - take account of within-grade sorting by estimating the effect of same-*grade* peers rather than same-*class* peers find no effect on test scores of exposure to SEN students (Hanushek, Kain & Rivkin, 2002; Friesen et al., 2010; Fletcher, 2010 for reading scores). A related study from Denmark (Rangvid, 2016) using full population data and more cohorts and years and thus is able to use a more elaborated model, also finds no effects on gain-scores in reading for the treatment years covered in this study. Yet, for earlier years with larger, reform-induced return flows, small negative effects of exposure to returners are found. Another Danish study (*Kristoffersen et al., 2015*) that also mainly happens to use data for earlier years (from the reform period) finds small negative effects of exposure to disruptive students.

Additional analyses

The analysis proceeds by exploring heterogeneous effects for regular class peers to returners who themselves have special educational needs and for other peers. For example, on the one hand receiving a recent returner might divert teacher resources from SEN peers to the newly returned students which may harm SEN peers' outcomes. On the other hand, the presence of a recent returner may alter teaching methods used in the classroom in a way that is also more appropriate for other SEN students in the class. This could improve SEN students' outcomes. Table 4 provides results that show no significant effects of exposure for either SEN or non-SEN peers. Thus, the overall message is that the analysis does not provide evidence for negative effects on peers, regardless of their own SEN-status.

Overall, the analysis of the effects of exposure to recent returners shows no evidence of negative externalities on regular classroom peers. This zero result on peers suggests that regular students are quite robust and are not easily affected by e.g. returning students. The fact that there is most often only a single returner at a grade level, since recent returners are spread widely across schools, probably also contributes to the zero effect.

Table 4: Regression results. Heterogeneous effects.

	SEN students				Non-SEN students			
	Effect of exposure to returner	se	#obs	#students	**Effect of exposure to returner**	se	#obs	#students
Well-being (at school)	0.057	(0.134)	1,186	593	0.096	(0.089)	4,898	2,449
Participation, learning activities	0.128	(0.113)	1,174	587	-0.060	(0.071)	4,882	2,441
Participation, social activities	0.005	(0.120)	1,158	579	0.063	(0.049)	4,808	2,404
Motivation & effort	0.146	(0.114)	1,182	591	-0.016	(0.061)	4,890	2,445
Academic self-confidence & progress	0.102	(0.110)	1,180	590	-0.040	(0.056)	4,890	2,445
Student-teacher relations	0.082	(0.128)	1,184	592	0.065	(0.063)	4,894	2,447
Academic acknowledgement	0.086	(0.094)	1,178	589	-0.006	(0.056)	4,886	2,443
SDQ (Strength & difficulties)	-0.010	(0.118)	1,166	583	-0.109	(0.109)	4,826	2,413
Concentration	-0.013	(0.135)	1,076	538	0.032	(0.113)	4,650	2,325
Reading scores	-0.028	(0.053)	2,144	1,077	0.026	(0.041)	10,226	5,113
Math scores	0.031	(0.075)	1,414	707	0.009	(0.048)	6,296	3,148

Standard errors are clustered at the school level.

6. The effects of returning to regular class rooms on returners

The last part of this study examines the effect of returning to regular class rooms on the returning students themselves. While there are no previous studies on the effect of returning to regular classrooms, related studies that analyze the effect of special needs education are not conclusive. Hanushek et al. (2002) finds positive effects on students' academic skills, while Keslair et al. (2012)[30] find no effects.

This analysis is limited to outcomes that can be retrieved from the administrative registers, because survey data is available only for returners and only upon their return to regular classes. Therefore, survey outcomes for typical control groups, for example returners before return or non-returners, are not available.

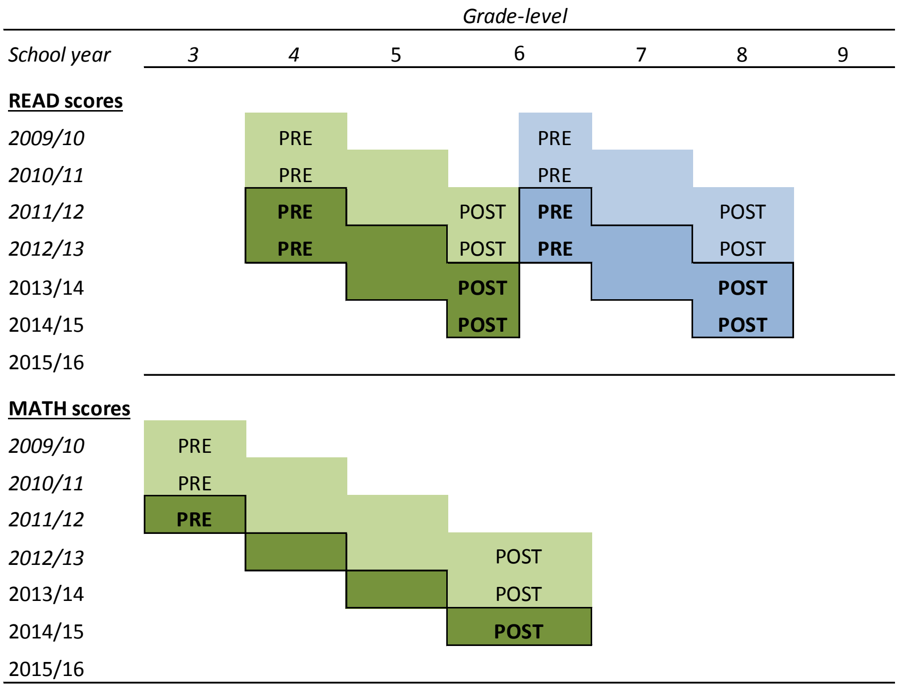
For this analysis, I use full population data from administrative registers for all students who are in the same grade levels as those who participate in the Inclusion Panel Study. Specifically, for the analysis of test score outcomes this is doable since survey information is not needed. Being able to extend the sample to the full population is an advantage, because the number of returners in the inclusion panel sample is not large. The estimation sample thus consists of students who are in segregated settings in the pre-period and who have repeated test score measures. With test score data currently available for the period 2010-2015, four cohorts of students are included in the analyses: students with pre-scores from 2010, 2011, 2012 and 2013. These cohorts have post-scores over the period 2012-2015. For the estimation, I select students who are in special school/class when pre-testscores are measured. When post-scores are measured, some will have returned to regular classrooms, while others will still be in special schools or classes.

The baseline method used is a difference-in-differences approach which compares changes in returners' and stayers' test scores pre- vs. post-return conditional on SES and school fixed effects. Yet, the concern is that it is not random who returns to normal classes. On average, students who "do well" are more likely to return. E.g. in the current sample, returners do 0.3 SD better at reading and math tests than stayers (in the pre-period). Two approaches are taken to mitigate selection bias. First, the difference in differences approach effectively controls for differences in pre-scores (while in special class/school). Second, I instrument return to regular class using the change in the share of students who the previous year returned to regular class in the student's municipality of residence. This approach uses between-municipality differences in the timing of the inclusion effort as exogenous variation in students' probability to return. The F-tests of the strength of the instrument are 29 and 40 for the reading and Math estimation, respectively, and are thus well above the usual cut-off of 10.

[30] Francois Keslair, Eric Maurin, Sandra McNallyb(2012): Every child matters? An evaluation of "Special Educational Needs" programmes in England. EER.

The use of instrument variables restricts the number of cohorts in the estimation, since the instrument is not available for older cohorts (due to data restrictions). As in the analysis for peers in the main study, test scores for reading and Math are used for the two student cohorts that are covered by the inclusion panel, i.e. for reading pre-scores for grades 4 and 6 and post-scores for grades 6 and 8; for math pre-scores for grade 3 and post-scores for grade 6 (Figure 6). As mentioned above, the use of instrument variables restricts the number of cohorts in the estimation, since the instrument is not available for older cohorts (due to data restrictions). For reading, the full number of cohorts available is four (with pre-scores in 2010-2013 and post-scores 2012-2015), while the IV-estimations can be run on the two most recent cohorts with pre-scores in 2012-2013 and post-scores 2014-2015. For Math, three cohorts are available for the simple DID-regressions (pre-scores 2010-2012; post-scores 2013-2015) and only one cohort for the IV-DID-regression (pre-score 2012, post-score 2015).

Figure 6: Data structure (analyses of effects on returners)



Note: The different shades of green denote the two student cohorts in the sample. PRE' and 'POST' mark the schoolyears with pre- and post outcomes measurements.
While all cohorts shown in the figure are included in the simple DID regressions, only cohorts marked in dark shades (green & blue) are included in the IV-DID regressions.

Results

Table 5 shows the results of the effect of returning to normal class on returners reading and Math scores. I present three sets of results for each outcome (reading and math scores): (i) simple DID results for all cohorts, (ii) simple DID results for IV-cohorts only and (iii) IV-DID results for IV-cohorts, the main model specification.

Table 5: Regression results for returners.

	Reading			Math		
	DID, all cohorts	DID, IV-cohorts	DID-IV	DID, all cohorts	DID, IV-cohorts	DID-IV
Effect of returning to normal class	0.075^{*} (0.030)	0.050 (0.044)	0.093 (0.328)	0.282^{***} (0.046)	0.294^{***} (0.079)	0.637^{*} (0.272)
N	18288	9984	9984	4018	1486	1486
F-test, strength of instrument			29			40

Simple DID-results are qualitatively similar across the full samples ('DID, all cohorts') and the restricted IV-samples ('DID, IV-cohorts'). Although the full sample estimate for reading scores is significant, but not the IV-sample result, the point estimates are probably not significantly different from each other. Also, the IV-results ('DID-IV) qualitatively confirm the simple DID results for the IV cohorts: no significant effect for reading scores, but a large and positive effect on Math scores. The main specification results using IV are roughly twice the size of the simple DID results and standard errors are also much larger with IV. The size of the significant effect on Math scores suggests that returning to regular class improves (the marginal returner's) Math scores by 0.64 of a SD over the 3-year period between math tests. It is important to note that without further assumptions results from the IV-model are valid for compliers only, i.e. for students who are induced by the instrument to return to regular class, because they happen to live in municipalities that return many students, but would otherwise stay in special school/class. These students will most likely be the students who are just at the margin of being placed in segregated education.

Caveats An important caveat of the analysis is sample selection: since both pre- and postscores are needed for identification, only SEN students with test scores in two subsequent tests can be included in the estimation. Since only 40-45% of students in special schools and classes sit the tests, the resulting sample is rather selective.

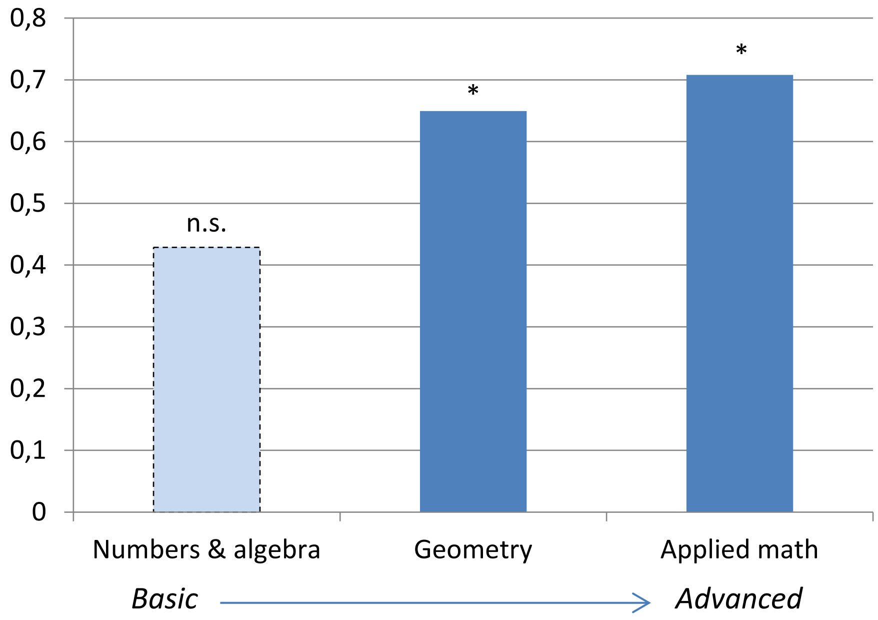
A concern with respect to the validity of the results would be selection into the estimation sample, since only students who sit the tests both in the pre- and the post-period are included in the estimation. If there are differences between special schools/classes and normal classes with respect to who takes the test and who is exempted, this may bias the results. However, examining the data, I find that a larger share among the returners than among stayers take the post-test (82 vs 69% for math). Thus, there is no evidence that selective test taking among returners and stayers drives the positive effects for Math.

Further results To examine the positive result on Math scores in more detail, the analysis has been repeated for each of the three Math subdomains, which are part of the total Math score: numbers & algebra (basic), geometry (intermediate) and applied math (advanced). The results are illustrated in Figure 7 and suggest that returning has a larger impact on the more advanced domains (geometry and applied math), while the effect on the basic domain *Numbers & algebra* is not significantly different from zero.

To sum up, the results on the effect on the returners themselves suggest that returning has a large positive effect on math testscores of roughly 2/3 of a standard deviation over a three year period for the marginal returner, but no effect on reading. It is important to understand that these results are not necessarily valid for all students in segregated settings, but probably only for a rather selective group of students with less severe special needs than the average SEN student attending special school or special class.

A mechanism that may explain that I find positive effects on math scores, while reading achievement is unaffected, is if teaching math is less of a priority than teaching reading skills in special schools and special classes. This may be the case if reading is regarded as a primary skill to learn, while math is secondary in a setting where students struggle to learn already. When moving to regular classes these students may face more teaching hours in math and higher expectations than they did in segregated special education, which may result in significant improvement in math achievement. The result that more advanced skills are more affected than basic skills supports the notion that teaching in special schools/classes focusses more on basic math skills, while teaching in regular classes includes more advanced topics.

Figure 7: Regression results for math subdomains.



7. Conclusion

Not all students with special educational educated in segregated academic settings stay for their entire school career, but some return to regular classrooms and must be re-integrated upon return. This study examines both effects on SEN students who return from segregated education settings to regular classrooms and externalities on academic achievement of their peers in the receiving cohorts. While previous studies analyze the effects of the presence of SEN students in schools and classes, this study explicitly concentrates on students who previously have been educated in special classes and schools. When these students return to regular classrooms, they need to adapt to a regular class environment which – at least during a transition period – might yield challenges for themselves, their teachers and peers.

The main analysis in this paper focuses on identifying academic externalities of becoming exposed to students who recently returned from special classes or schools to regular classrooms. Potential selection into treatment is mitigated by using a student fixed effects approach, thus comparing changes in the outcomes of students who become exposed to recent returners with those who stay unexposed. The estimation strategy exploits data from a large scale survey and data from administrative registers. As outcomes, a range of cognitive and non-cognitive skills is investigated, but I find no evidence of a causal effect of being exposed to returning students on same-grade peers' outcomes. This conclusion holds both for peers with and without special needs in regular class rooms.

However, a related study (Rangvid, 2016) that examines externalities under reform-induced return flows with much larger number of returners provides evidence that small negative externalities on peers' reading scores may exist in such circumstances. In Rangvid (2016), I examine the full population of students over a longer period covering both years with normal return flows and years with large return flows due to a reform. I show that peers' reading scores are differentially affected by exposure to returners in the two periods: reading scores are unaffected in years with normal return flows, while there is a small negative effect in years with large numbers of returners.

A further analysis investigates the effect for the returners themselves – using test score outcomes, which are available in the administrative registers. While this analysis is based on a highly selective sample (SEN students who have both pre- and post-testscores from the national tests), the results suggest large gains from moving into regular classrooms in Math (two thirds of a standard deviation), with effects being stronger for more advanced topics. Reading results are unaffected. A mechanism that may explain the differential effects for math and reading scores is if math is less of a priority compared to reading in special schools/classes than in regular classes, such that returning students experience a change in math teaching with more teaching hours and higher expectations that facilitates math learning (but less so in reading). The larger positive effects on more advanced math skills supports the notion that teaching in special schools/classes focusses more on basic math skills, while teaching in regular classes also includes advanced topics.

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Appendix

Table A1: Descriptive statistics of variables used in the empirical analysis

Variable	Obs	Mean	SD
Boy	5964	52%	0,50
Lives with both parents	5964	82%	0,38
Dane	5964	93%	0,25
First generation immigrant	5964	1%	0,07
Second generation immigrant	5964	6%	0,24
Psychiatric diagnosis at age 8	6084	3%	0,18
Mother's age at birth	5930	35,3	4,53
Father's age at birth	5868	37,8	5,43
Mother's education			
Lower secondary school	5860	16%	0,37
Vocational education	5860	35%	0,48
High school	5860	7%	0,26
Short cycle higher education	5860	4%	0,20
Medium cycle higher education	5860	27%	0,45
Long cycle higher education	5860	9%	0,29
Father's education			
Lower secondary school	5766	17%	0,37
Vocational education	5766	44%	0,50
High school	5766	5%	0,22
Short cycle higher education	5766	8%	0,27
Medium cycle higher education	5766	15%	0,35
Long cycle higher education	5766	12%	0,32
Income, mother	5842	16%	0,11
Income, father	5930	13%	0,05
Mother's labour market status			
Mother: Self-employed	5868	8%	0,27
Mother: wage earner, top	5868	20%	0,40
Mother: wage earner, medium	5868	14%	0,35
Mother: Wage earner, bottom	5868	30%	0,46
Mother: Wage earner, other	5868	20%	0,40
Mother: Permanent income transfers	5868	5%	0,22
Mother: Others	5868	3%	0,16
Father's labour market status			
Father: Self-employed	5930	3%	0,16
Father: wage earner, top	5930	15%	0,36
Father: wage earner, medium	5930	23%	0,42
Father: Wage earner, bottom	5930	30%	0,46
Father: Wage earner, other	5930	12%	0,32
Father: Permanent income transfers	5930	10%	0,30
Father: Others	5930	8%	0,27